

**DEPARTMENT OF BUILDINGS
AND GENERAL SERVICES**

SECTION 16000

ELECTRICAL REQUIREMENTS

PART 1 - GENERAL REQUIREMENTS

1.1 General Requirements

- A. All sections of Section 1.
- B. Examine all drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section. Work shall be coordinated with other trades prior to installation to prevent interference and relocations.

1.2 Scope of Work

- A. The work required under this Section shall include all materials, labor, equipment and services necessary to furnish and install in accordance with the drawings and specifications all items listed, but not limited to:
 - 1. Telephone Outlets
 - 2. Computer Outlets
 - 3. Lighting Fixtures
 - 4. Mechanical Power Wiring
 - 5. Power Distribution (As Shown)
 - 6. Existing equipment being reused or relocated and wired by Electrical Contractor
 - 7. Equipment furnished by others and wired by Electrical Contractor
 - 8. Demolition of existing electrical work
 - 9. Coring
 - 10. Pipe sleeves

1.3 Work Under Other Sections

- A. Work specified under other sections includes, but is not limited to the following:
 - 1. Cutting and patching (with exception of coring)
 - 2. Painting
 - 3. Heating work

1.4 Shop Drawings

- A. Shop drawings of all shop fabricated items described herein shall be submitted for review. Submittals shall be marked with item designation. Drawings shall show in detail; layout and installation details, including size and arrangement of all parts, the relation to the work, or the other trades, and all other details required for the proper installation of the work. No fabrication shall take place until shop drawings have been reviewed.

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B. Prior to starting work submit four * (4) shop drawings of the following equipment for review.

1. Lighting fixtures
2. Panelboards
3. Wiring devices
4. Circuit breakers
5. Cover plates for all devices
6. Rigid conduit and EMT including fittings, etc.
7. Disconnect switches
8. Motor starters
9. Boxes - junction, outlet, splice, terminal

1.5 Definitions

A. The following definitions shall be used throughout this Section.

1. "The Subcontractor" or "this subcontractor" denotes specifically the contractor working under this Section of the specifications.
2. "Furnish and install" or "provide" denotes to supply, erect, install and connect up, complete in readiness for regular operation, the particular work referred to, unless otherwise specified.
3. "Concealed" denotes hidden from sight in trenches, chases, furred spaces, shaft, precast tubes, embedded in construction, hung ceilings or in crawl spaces.
4. "Exposed" denotes not installed underground or "concealed" as defined above.

1.6 Salvage

A. Existing equipment and/or materials relating to the Electrical system shall be removed when so indicated on the drawings, or when no longer needed because of the work performed under this contract. Equipment removed shall be delivered to a point on the premises designated by the Owner. If the Owner does not wish to retain the equipment, it shall be removed from the premises by this Subcontractor.

1.7 Protection of Work and Property

- A. This Subcontractor shall be responsible for the care and protection of all electrical work included in this Section of the specifications and drawings until it has been tested and accepted.
- B. After delivery and before, during and after installation, this Subcontractor shall protect all equipment and materials from injury or damage of all causes as well as from theft.
- C. Upon completion of the entire installation, this Subcontractor shall thoroughly clean all parts of his equipment and materials. All units shall be cleaned to remove all foreign materials. All

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equipment and materials shall have the surface free of all foreign matter; scratches in appointed surfaces shall receive matching touch-up paint. If the cleaning or touch-up paint will not restore the original finish as determined by the Engineer, the entire surface of the item shall be painted at this Subcontractor's expense.

- D. This Subcontractor shall also protect all outlets and all conduit openings with temporary plugs or caps.

1.8 Record Drawings

- A. At the conclusion of the work, the Electrical Subcontractor shall prepare and deliver a complete set of blue or black line on white print on which shall be accurately shown the actual installation of the work indicating thereon any variations from the contract drawings.

1.9 Coordination and Cooperation

- A. The Electrical Subcontractor shall obtain detailed information from the manufacturers of apparatus which he is to furnish or install as to the proper method of installing and connecting same. He shall also obtain all information from the other contractors which may be necessary to facilitate his work and the completion of the whole project.

1.10 Testing

- A. It shall be the responsibility of this Contractor to furnish all testing, equipment and labor necessary to perform the following tests:
- B. After wires or cables are in place, but before being connected to devices and equipment, the system shall be tested for shorts, opens, intentional and unintentional grounds by means of an approved type of constant "Megger". All hot wires in conduit that are shorted or unintentionally grounded shall be replaced.
- C. With the system energized, line-to-line voltage and line current measurements shall be made at the motors under full load conditions. Should measured values deviate +/- 10% from the nameplate ratings, the condition shall be corrected. Notify the Engineer immediately should deviations occur.
- D. All wiring devices, lighting fixtures, and electrical apparatus in this contract shall be tested as required by the manufacturer and/or local authorities.
- E. All tests must be conducted in the presence of the job superintendent and a typewritten copy of all tests, certified by the electrical subcontractor shall be submitted to the Engineer for review. Test date shall include the name of the building, equipment tested, and nameplate data of all equipment.

1.11 Warranties, Guarantees and Services

- A. The Contractor shall be able to furnish adequate replacement

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parts, employ their own factory authorized service department to maintain satisfactory operation and maintenance at all times.

- B. The system, in its entirety, shall be warranted by the successful Contractor for a period of one (1) year from date of acceptance.
- C. The Contractor shall also furnish additional information relative to warranties of equipment and guarantees of parts and workmanship concerning all items included in the submission.
- D. Any special fabricated replacement parts for the proposed equipment shall be available for a period of at least ten (10) years from date of purchase.

1.12 Repairs During Guarantee Period

- A. Electrical subcontractor shall replace or repair at his own expense, any part of the work performed or furnished under this Section of the work which proves defective in workmanship or materials within the period defined in the General Provisions and/or property and operations of the Owner which has been destroyed or damaged due to defective work or defective material, including the cost of emergency hookups necessary to keep the building in operation until permanent repairs have been made.

PART 2 - PRODUCTS AND EXECUTION

2.1 Basic Materials and Methods

- A. In general, all materials shall be new, UL approved, and listed for the specific application as specified or as required, and be properly installed.
- B. All work shall be performed in accordance with acceptable industry standards except where specified procedures are called for in these specifications in which case they shall be followed. If not specified, standard methods shall be used. It is strongly suggested that all procedures be reviewed with the Engineer prior to beginning the work in order to avoid changes costly to this Subcontractor.

2.2 Location of Outlets

- A. In order that all outlets may come in proper relation to paneling, decorated area, etc., this Contractor shall familiarize himself with the details of these spaces and shall carefully lay out all outlets so that the equipment or piping of other trades passing under, over, across or in close proximity to same, will not cause the devices or fixtures at or in these outlets to be inaccessible for use or maintenance. This Contractor must consult with the other Contractors on the project and procure all details of the various locations so as to make the outlet boxes, panelboards, etc., come in proper relation to the work of all other Contractors. He shall be responsible for the exact and proper location of the various portions of his work, and such work must entirely satisfactory to the Engineer. Consult the Architectural Drawings and Details.

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- B. All light switches unless noted are to be located on latch side of door. Coordinate all locations with the latest set of Architectural Drawings and with the General Contractor before, installing.
- C. All outlet boxes for surface-mounted fixtures shall be four inch octagonal or square; minimum of two inches deep attached to building construction for suspended ceilings; deep concrete boxes for poured concrete ceiling construction; be installed with 3/4" minimum depth plaster rings on suspended ceilings; four inch octagonal or square for exposed conduit work with fixture extension pan or deep fixture canopy to enclose box.
- D. All outlet boxes for recessed fixtures shall be: four inch square or octagonal minimum of 1-1/2" deep complete with blank cover; installed above fixture opening; connected to fixture with Greenfield of such length to service fixture, but not more than 5'0" long, and wire size minimum #12 AWG type THNN 300 volt.
- E. All receptacle boxes installed in masonry walls shall be masonry type, in plaster or dry wall they shall be solid ganged boxes with plaster rings to bring edge of ring flush with wall so that device cover shall, be tight and plumb with wall finish. Switches shall be located within six inches of the door jambs.
- F. Bracket outlets shall be level and centered on columns, or above doors when installed in these locations. Wall switch outlets at door locations shall be on lock side of door. See Drawings for special mounting heights.
- G. Where indicated on Drawings, and noted in Specifications, outlets on exposed conduit systems shall be of threaded-hub, cast metal, conduit type fittings suitable for wiring devices to be installed. Covers, (blank, switch, receptacle, etc.) shall be a type designed to fit specified fittings.
- H. Pull boxes and junction boxes shall be: Installed as required by NEC and in all runs of conduit having more than 100 feet in length or equivalent of four (4) bends; entirely accessible #16 gauge galvanized steel up to 12" x 12" x 12" size and #10 gauge over 12" x 12" x 12" size; complete with covers of same gauge as boxes and secured to box with screws; be securely mounted to building structure independent of conduits connected to them. Pull boxes shall be indicated on Contractor's shop drawings.
- I. Tamper proof screws shall be installed on all devices and exposed boxes within all security areas or as directed by Engineer. Screws shall be "oval head" manufactured by Fail Safe or Avidel Co. Coordinate with Engineer.

2.3 Conduits, Fittings and Installation

- A. All wiring shall be installed in NEC approved raceways, sized as shown on Drawings, or, if not sized on the Drawings, in accordance with latest edition of NEC except that no conduit smaller than 3/4" shall be allowed unless otherwise noted.
- B. Conduit and elbows shall be as manufactured by Pittsburg Steel, National Electric, Youngstown, or equivalent. Conduit fittings and couplings shall be as manufactured by

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Appleton Company or equal.

- C. Prior to roughing in, this Contractor shall coordinate installation of conduit and outlets with other trades.
- D. Conduits shall be continuous from outlet to outlet, from outlets to cabinets, pull or junction boxes, and shall be secured to all boxes with lock nuts and bushings in such a manner that each system shall be electrically continuous throughout.
- E. Conduits shall be securely supported at proper intervals to building structure with steel clamps, or conduit hangers or by supporting assemblies as shown on Drawings.
- F. No conduit shall be run above or adjacent to steam or water piping.
- G. Electrical metallic tubing (EMT) may be used for feeders and branch circuit-conduit runs, excluding service entry conduits. *P.V.C. conduit (Sch. 40) may be used for same with prior permission from the Engineer.
- H. Rigid conduits shall be used in or under concrete construction; in moist areas, *(and) for service entrance work *(and where accessible to inmates). IMC may also be used for same with prior permission from the Engineer.
- I. All rigid conduits shall be hot dipped galvanized rigid steel or heavy wall steel pipe, bear UL label and meet UL Standard #6. All conduits shall be cut square, threaded, reamed smooth and drawn tight in that order. Bends or offsets shall be made with standard conduit ells.
- J. When installed in or under concrete or underground, conduits shall have watertight sealed joints.
- K. All conduits shall be installed perpendicular; and parallel to building lines.
- L. Flexible conduit shall be Greenfield type in dry locations with squeeze type connectors; be "seal tight" in all wet locations with Appleton/"Sealtite" ferrule and sleeve type connectors; be used for all final connections to motors and light fixtures (except when recessed in concrete).

2.4 Identification

- A. Each item of equipment, including main switchboard, terminal connecting cabinets, panelboards, motor starters, fire alarm equipment, emergency lighting equipment, safety switches, motor controls shall be identified by a permanently attached nameplate made of black surface, white core laminated bakelite with incised letters.
- B. Nameplate shall be a minimum of three inches long and one and one-half inches wide and shall bear the equipment name.
- C. The permanent attachment shall be screws except where not permitted by the equipment criteria.

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- D. Identify circuits contained in: pullboxes, junction boxes and connection boxes, by labeling inside of cover with either a phenolic tag or neatly hand written with indelible marker.

2.5 Access Panels

- A. This Subcontractor shall furnish all access panels necessary to his work in concealed spaces and of the correct size needed to maintain his work. These access panels shall be compatible to the type of construction where they will be installed.
- B. Access panels shall be similar to those manufactured by Inland Steel Products Company, L.M. Walsh Company Babcock-Davis Associates, Inc., or equal.

2.6 Coring

- A. All coring associated with the work of the Electrical Subcontractor shall be done by the Electrical Subcontractor. Coring shall be accomplished by means of a coring machine.

2.7 Pipe Sleeves

- A. General: Pipe sleeves for all conduit shall be furnished and set by the Subcontractor and the Subcontractor shall be responsible for their proper and permanent location.
- B. Pipe Sleeves: Pipe sleeves shall be installed and properly secured at all points where conduits pass through masonry, concrete or wood. Pipe sleeves shall be of sufficient diameter to provide approximately 1/2" clearance around the outside. Pipe sleeves through concrete floors shall be steel pipe and shall be installed 1" A.F.F. and shall be fire stopped after conduit is installed.

2.8 Installation and Application of Wires and Cables (600 Volts)

- A. All cable or wire shall be installed in specified raceways or conduit, unless otherwise noted on drawings, be not less than #12 AWG, (except that #14 AWG, may be used for control and low voltage wiring); and have type insulation as follows:
- | | |
|----------------------------------|---|
| 1. General use areas | THW, THWN or XHHW (Branch Circuits) |
| 2. Wet or moist locations | THWN or RR |
| 3. Feeders to panels | THWN, THHN or XHHW |
| 4. Wiring in boiler or hot rooms | THWN, THHN or XHHW |
| 5. Service entrance | THWN or XHHW*[in conduit, or Service Entrance Cable] |
| 6. Buried distribution | RR, THWN |
- B. All internal fixture wiring shall be minimum #12 AWG, type TFN or TF (150°C) with minimum 300 volt insulation.
- C. All branch circuit wiring shall be done with color coded conductors, using same code throughout.

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1. For 120/208V:

- a) Mechanical Ground Green Single
- b) Neutral White
- c) Phase A Black
- d) Phase B Red
- e) Phase C Blue

* 2. For 277/460V:

- a) Mechanical Ground Green Single
- b) Neutral Grey
- c) Phase A Orange
- d) Phase B Yellow
- e) Phase C Brown

- D. Colors as selected for purpose of identifying circuits shall be applied to wire. Colors must be fast, fadeless and capable of withstanding cleaning in the event that a wire becomes soiled.
- E. All conductors shall be solid copper 98% conductivity and soft drawn. Stranded wire #6 AWG and larger only.
- F. At least six inch (6") long loops or ends shall be left at each outlet for installation of devices or fixtures in future. All wires in outlet boxes not for connection to fixtures at that outlet, shall be rolled up, connected together and taped.
- G. For receptacle and florescent lighting circuits, run individual neutrals for each phase. Shared neutrals shall not be allowed. Neutrals conductors to be same size as phase conductors.

2.9 Grounding

- A. This shall be a completely, grounded system. All electrical equipment, conduits, supports, cabinets, switchgear shall be grounded in accordance with the latest edition of the NEC Art. 250 and/or as shown on the drawings. The intent being system ground and an equipment ground.
- B. Provide a green grounding conductor in all circuits.

2.10 Telephone Service

- A. This Contractor shall furnish and install empty conduit for a telephone system as shown on drawings, as specified and in conformance with local telephone company.
- B. Provide a nylon fish tape in all empty conduits and insulated bushings on all conduit ends for wire pulling.

2.11 Power and Lighting Branch Circuit Panelboards

- A. Panelboards: Panelboards, in general, shall be of type specified or as NEC required for their

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location and application, and manufactured by Square D Company, W.E., G.E. or I.T.E. (to match existing).

- B. All panelboards shall be enclosed in a code-gauge steel cabinet not less than 20" wide; have dead front construction; flush or surface mounted type (as show); have "monoflush" trim; have minimum 5" wide top and bottom wiring gutter and 6" gutter; have bus structure of size and rating call for, braced for minimum of 10,000 RMS amps, and capable for feeding lugs of solid neutral; be mounted with top cabinet 6'-0" above floor level; have neutrals grouped on a common bar and all terminals stamped with number of circuit; be UL approved; have solid copper bus bars of 98% conductivity, and minimum cross sectional area based upon 800 amps per square inch; have doors equipped with concealed hinges, spring lock or bat latches; have framed directory inside door with 1/16" thick glass or plastic cover and typewritten directory card; have "door-in-door" type (piano hinge) fronts finished in blue-grey lacquer; insulated neutral and grounding terminals.
- C. Wiring in panelboards shall be neat and served with "TY-Rap", or equal.
- D. Panel Type: All branch circuit panels shall be of the circuit breaker type of sizes listed in panel schedule or noted on Drawings.
- E. No more than 5 wires (3 phase, 1 neutral, and 1 ground wire) shall be installed in Home Runs to Panels.

2.12 Breakers

- A. Breakers shall be quick-make, quick-break; have toggle mechanism, insuring full contact pressure until time of opening whether manually or automatically operated; have inverse time tripping characteristics with fixed thermal and magnetic trip action to hold on harmless momentary overload; on short circuit the magnetic trip element shall instantly trip without damage or injury; having non-welding, noncorroding contacts; mechanism enclosed in molded bake-lite case, sealed to prevent tampering or unauthorized changes in calibration; be UL listed and meet NEMA standards; have contacts operate in a multiple plate arc-quenching chamber vented to load side of breaker; be rated 10,000 A.I.C. for branch circuits or be rated for A.I.C. compatible with rating of the panel bus. When over 225 amp, breakers shall have interchangeable trips. Breakers shall be bolt-on type.
- B. All breakers must indicate clearly their size, must clear panel doors and be mounted on frame allowing outward and inward adjustment. The depth of the tubs shall also permit adjustment. Each breaker shall be provided with a numerical designation strip. Single pole breakers shall not exceed 3/4" in height.
- C. The following schedule shall apply to breaker types and sizes (SQ D Company designations are used), unless otherwise noted on drawings.

FRAME SIZE	TYPE
50 AMP	QOB
100 AMP	FA/QOB

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225 AMP	KA
400 AMP	LA
800 AMP	MA

- D. All multiple pole breakers shall have common trip. Wire, pins, etc., between single pole breakers to form common trip will not be acceptable. In general, all 120 volt lighting and receptacle circuits shall be run from 20 amperes single pole breakers. Unless specifically called for, or NEC required, no breakers less than 20 amperes shall be allowed. Where spaces are called for they shall be complete with bus links. The use of "Multi" "Push-O-Matic" or "Quicklag" breakers shall not be permitted.

2.13 Load Balancing

- A. Subcontractor shall balance all loads between phases in all panels, etc., around neutral. Each circuit shall be clearly identified by color as to phase connection. Where common neutral is run for branch circuits, phase wires of home run shall be connected to separate phase legs in order that neutral will carry only unbalanced current in phase circuits. Common or shared neutrals will not be permitted for receptacle or florescent lighting circuits. Neutral conductors shall be same size as phase conductors unless specifically noted otherwise.

2.14 Final Connections to Electrical Equipment Furnished by Others

- A. Furnish all power wiring, disconnects, fuses, breakers and outlets, etc., and make final connections to all equipment as shown on the drawings and as required by equipment manufacturer. This subcontractor shall be responsible for the proper location of outlets and controls and shall verify with the individual equipment contractors exact heights, location, size, etc., required prior to roughing in. No extras will be considered as a result of this subcontractors failure to obtain this information prior to starting his work.

2.15 Wiring of Mechanical Equipment, Motors and Motor Starters

- A. This subcontractor shall furnish, install and wire complete all thermal protective switches, disconnect switches, fuses, starters, thermal overload heaters, holding coils, remote pushbutton stations, H-O-A and multi-speed switches and pilot lights, etc., for all electrically operated mechanical equipment and motor including final connections, as shown on the drawings and as herein specified, leaving same ready for operation.
- B. Where disconnect, thermal switches, starters, etc. come as part of the mechanical equipment (such as packaged equipment). This subcontractor shall furnish and connect all power wiring leaving same ready for operation.
- C. All final connections to motors shall be made with "Sealtite" flexible conduit, not less than 18" or more than 36" long, using Appleton Sealtite connectors.
- D. Consult with all contractors furnishing the above referenced equipment; such as, plumbing, heating, ventilating, etc., prior to order or installing equipment to verify the starter type and size with the motor boxes, switches, etc. on the job in order to locate them close and correctly for the

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equipment they serve. No extras will be allowed for relocation or replacement of electrical wiring because of this contractor's failure to coordinate with other contractors.

- E. The respective mechanical contractors, unless otherwise specified, or shown on the drawings, will furnish and install all conduit, wiring, and devices required for automatic control work (such as E.P. switches, pressure-state, auto valves, relays, float switches, alternators, etc.), and shall be responsible for their equipment.
- F. Motors for all equipment under this Section shall be designed for quiet operation and shall be guaranteed to run without objectionable noise or vibration. All single phase motors shall have overload protection. Loose motors to be energy efficient equal to General Electric Tri-Clad 700, sever duty or Delco E2 motors. Motors below 1/2 HP shall be single phase 120 volt. Motors 1/2 HP and larger shall be three phase, 208 volt.
- G. Starters are to be supplied by mechanical contractor and/or trade supplying the motor to be controlled and installed by electrician if not part of packaged equipment. All starters, whether packaged or not, to be of the same manufacturer and shall meet starter section of specification below.
- H. Provide all single phase motors less than 1/2 IT with motor thermal switches, type as required, equal to Sq D class 2510 2512.
- I. All motor starters furnished shall be either A/C manual or A/C magnetic; and have under voltage protection; be size; have built-in start/stop, P.B. station and/or H-O-A selector switches as noted on Drawings; have appropriate NEMA enclosure; have 120 volt control circuit transformers for all magnetic starters; be front operated and have pilot lights in cover.
- J. Motor power wiring shall be minimum No. 12 (AWG) copper wire (unless otherwise noted on the drawings).
- K. Motor starters shall be manufactured by Sq D, Westinghouse, or G.E. Substitutions will only be accepted with prior approval from Engineer.

2.16 Switches, Receptacles and Wiring Devices

- A. Wiring devices, switches, convenience outlets, etc., shall be of spec. grade quality as manufactured by G.E. Leviton, Arrow, Hart or Hubbell, Underwriters listed and NEC rated. All receptacles, room switches, etc., shall have a finish as selected by the Engineer. Gang plates shall be used for all multiple device locations; in no case shall individual plates be ganged. This includes telephone, TV, volume controls, dimmers, or TT switches.
- B. All receptacles shall be of the grounded type as herein specified.
- C. It shall be the responsibility of this Contractor to verify that the General Contractor has patched around openings and not damaged any devices. Where damaged or painted devices occur, they shall be replaced or cleaned to the satisfaction of the Engineer at no additional expense to the Owner.

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- D. Where cover plates do not completely conceal the rough openings for the devices, it shall be the responsibility of this Contractor to patch, paint, etc., around the opening to the satisfaction of the Engineer.
- E. Where more than one device occurs in one outlet box, causing 300 volts or more between them, a barrier must be provided between them to meet NEC.
- F. Cover plates for switches and receptacles shall be as herein specified.
- G. Wiring devices shall be of the following specified type: (Leviton Numbers are used)
 - 1. Switches:
 - Single pole - #5521-I
 - Three Way - #5523-I
 - Switch with Pilot - #5226-I
 - Toggle Switch - #5731
 - Double Pole - #5522-2I
 - 2. Receptacles:
 - Duplex - PASS & SEYMOUR #26342-1 with Wall Plates #526N
 - 3. Wall Plates:
 - Switches & Outlets - 8400 series - stainless steel .040 thick - Non/Magnetic
 - 4. Pilot Light:
 - 110 volt neon - Alco #BNE-3
 - 5. Combination Devices:
 - Switch/Receptacle #5222-I

2.17 Safety Switches & Fuses

- A. Provide, where noted on the Drawings or required, general duty, front operated, fusible (or non-fusible as required or shown on the drawings), enclosed safety switches manufactured by Square D., W.E. or G.E.
- B. Switches shall be in proper NEMA enclosures as required by location or as noted on the Drawings, quick-make and quick-break type; horsepower rated; capable of interrupting the locked rotor current of the motor served (which current will be assured as being six times the rated full load current) and be combined within the motor controller enclosure, where feasible.

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- C. For all single phase motors less than 1/2 HP, the motor thermal switch shall suffice as the disconnect means.
- D. Where separate control voltages are used for control circuits within the motor controllers, the disconnect device shall disconnect simultaneously the control circuits together with the power circuits.
- E. Where a "twist-lok" disconnect is used for a motor or other load, this Contractor shall be responsible for verifying that the equipment to be served has thermal (running) protection and providing same if it does not have it.

2.18 Fuses

- A. All fuses shall be of the same manufacturer and manufactured by Bussman Manufacturing Division, ITE, or Chase Shawmut and of size and type required for the application as recommended by the manufacturer. In general, if the load is 300 amps or less, use Buss Fusat of fusetron up to 120 volts service.

2.19 Lighting

- A. Furnish, Install and connect up completely, all light fixtures described herein and as shown on the drawings. Provide all necessary hangers, supports and trim and include all lamps and ballasts as described elsewhere in this Section. The type letter designation is shown on the drawings to indicate the fixtures to be used in each location.
- B. Lamps:
 - 1. Contractor shall provide all lamps as required throughout for all fixtures, of General Electric, Sylvania or Westinghouse manufacturer.
 - 2. Incandescent lamps for general use shall be Type "C" Style "A", medium base, inside frosted 125-130 volt (for longer life).
 - 3. Rapid start fluorescent lamps for general use shall be 32 watt super savers, 48 inch, T-12 medium bi-pin. All lamps shall be warm white in color.
 - 4. Specials shall be as called for in the fixture schedule.
- C. Ballasts:
 - 1. Ballasts shall be high efficiency, electronic ballasts, suitable for fixtures, 120 volt.
 - 2. Ballasts data is to be included on the shop drawings submitted for light fixtures.
- D. Fixture Hangers:
 - 1. All light fixtures shall be adequately supported. Surface mounted fixtures shall be stud

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mounted to boxes which are securely attached to the building structure. Fluorescent fixtures which are recessed in the ceiling shall be secured to ceiling suspension systems. Provide yokes for troffers which cannot be support on ceiling channels. Be sure fixtures are level. No wood bridging or blocking, wire, chains, or inadequate supports or mounting methods will be permitted. Coordinate with fixture manufacturer for proper mounting requirements which may, differ from design requirements, prior to roughing. Provide all mounting hardware and hanging material as required by fixture manufacturers.

END OF SECTION 16000